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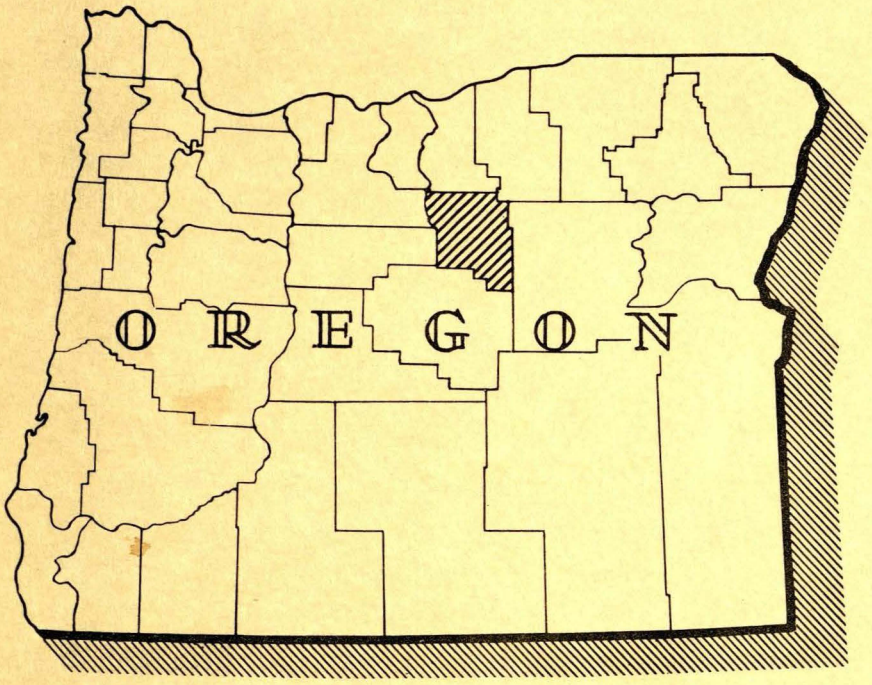
FOREST STATISTICS FOR WHEELER CO., OREGON

FOREST SURVEY REPORT NO. 119



U. S. DEPARTMENT OF AGRICULTURE · FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

PORTLAND, OREGON MARCH 1955

PREPARED BY THE DIVISION OF FOREST ECONOMICS

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1/ Acknowledgment is made of cooperation from public and private agencies in furnishing cutting and ownership records.

FOREST STATISTICS

FOR

WHEELER COUNTY, OREGON

Forest Survey Report No. 119

by

F. L. Moravets

U. S. Department of Agriculture Forest Service
Pacific Northwest Forest and Range Experiment Station

R. W. Cowlin, Director
March 1955

FOREWORD

This publication summarizes in statistical form the results of a reinventory of the forests of Wheeler County, Oregon, conducted in 1953. This reinventory is a part of the maintenance phase of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other products on them, to ascertain rates of forest growth and depletion, to estimate present consumption of timber products and to analyze and make available in reports survey information needed in the formulation of forest policies and programs.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey the forests of Wheeler County were inventoried in 1936. A statistical report, "Forest Statistics for Wheeler County, Oregon" and a detailed forest type map--scale 1 inch to the mile--were released. The reinventory was conducted during the months of August to October 1953. Another result of the reinventory is a revised forest type map of the county, on a scale of either 1 or 2 inches to the mile. 1/

1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, P. O. Box 4059, Portland 8, Oregon.

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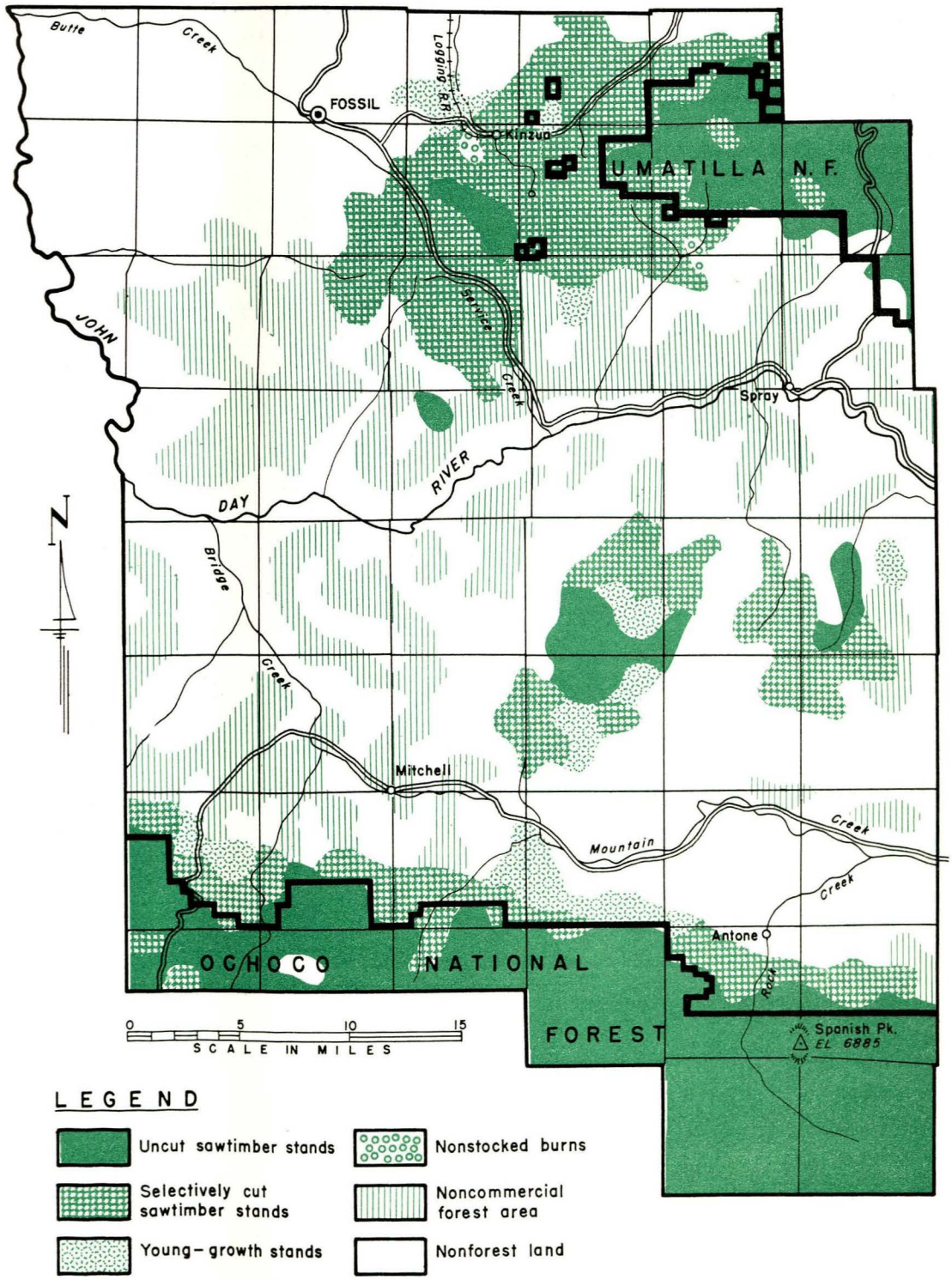
FIGURE 1

FOREST STAND-SIZE AND CONDITION CLASSES

WHEELER COUNTY, OREGON

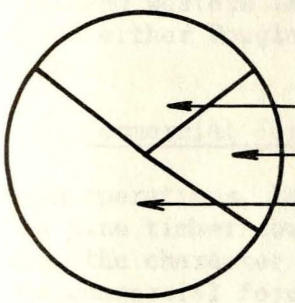
1953



SIGNIFICANT FINDINGS IN THE FOREST INVENTORY

LAND CLASSIFICATION

Wheeler County lies in north-central Oregon in a western extension of the portion of the State known as the Blue Mountains. It is a small county, with a land area totaling 1,102 thousand acres. Its fairly high plateau-like surface is broken by two western-reaching mountainous spurs, one crossing the northern one-third of the county, the other roughly paralleling the southern boundary. Between the two spurs, and flowing from east to west, the John Day River has cut a deeply entrenched canyon (fig. 1). Numerous tributary canyons, and occasional steep-sided buttes rising from the plateau, further accent the rugged topography. Average elevation is about 3,500 feet but extremes are from a low of 1,200 feet where the John Day River leaves the county to 6,885 feet, the top of Spanish Peak in the southern portion. Average annual precipitation ranges from 5 inches at the lower elevations to 25 inches on the higher levels.



Land Use

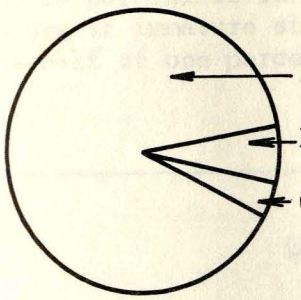
Class	Thousand acres	Percent
Commercial forest	357	32
Noncom'l. forest	209	19
Nonforest	536	49
Total	1,102	100

The wide variance in physical features results in the county being divided into three land-use classes. The higher, better-watered areas, suitable for conifer timber growth of merchantable character, comprise the commercial forest land zone. This zone consists of three independent units (fig. 1). The largest unit is a broad belt of timber across the extreme southern portion of the county. The second occupies the hog-back ridge of the mountain spur in the northern portion; and the third, located in the east-central portion, is a distinct forest island spread across the divide between the John Day River on the north and Mountain Creek on the south.

The second land class consists of a woodland type of western juniper occupying sites too dry for commercial tree growth. The major part of the acreage of this class lies in the west-central portion. Here the juniper forms an irregular pattern of patches of sparsely stocked trees of low, bushy form. Because of the low quality and small value of the trees for timber production the woodland type is classed as noncommercial forest land.

The third land class is the nonforest land which comprises nearly half of the county's total area. This class consists of broad areas of sage-brush-covered slopes, narrow stream bottoms, natural meadows and glades in the forest zones and rock barrens. According to the Census of Agriculture, in 1949 the area of cropland was 45 thousand acres, of which about half produced harvested crops during the year. Chief value of the nonforest and noncommercial forest land is for seasonal grazing of cattle and sheep.

Commercial Forest Land by Major Types



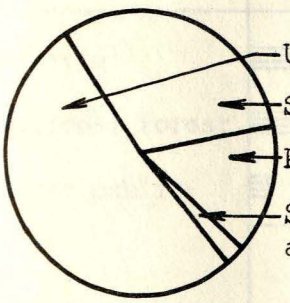
Major Forest Types

Type	Thousand acres	Percent
Ponderosa pine	322	90
Fir-spruce	21	6
Other	14	4
Total	357	100

Ponderosa pine occurs throughout the commercial forest zone except on the cool, more moist northern slopes. Over much of the zone this species forms pure, or nearly pure, stands. Douglas-fir and white fir are associates in the mixed pine types. The "fir-spruce" type in this county is comprised of stands in which white fir (Abies concolor and grandis) predominates. This type is found on the northern slopes and usually has a minor composition of Douglas-fir and western larch. Included in the "other" major types are stands in which either Douglas-fir, lodgepole pine, or western larch is the key species.

Commercial Forest Land by Stand-Size and Condition Class

Logging operations, largely on a partial-cut basis that removed the ponderosa pine timber down to a minimum diameter limit, have materially altered the character of the stands on 150 thousand acres, or 42 percent, of the commercial forest land area. On three-fourths of this logged area the residual stands are of sufficient volume--1,500 board feet, Scribner rule, per acre--to qualify as selectively cut sawtimber. Practically all of the remainder of the logged land is now stocked with young stands, principally of pole size. Other young stands, on some 20 thousand acres, have stocked lands depleted by the activities of such natural agencies as forest insects, disease, or fire. Of the 186 thousand acres of uncut sawtimber stands, the timber on 86 percent is classed as large--trees more than 21 inches d.b.h.-- and 14 percent as small--trees 11 to 20 inches d.b.h.



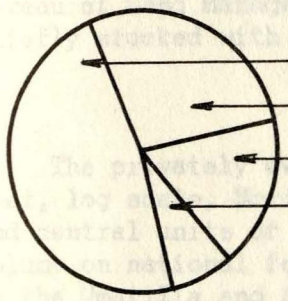
Stand Size or Condition

Class	Thousand acres	Percent
Uncut sawtimber	186	52
Sel. cut sawtbr.	112	31
Poletimber	54	15
Seedling, sapling and nonstocked	5	2
Total	357	100

TIMBER VOLUME

Net volume of live sawtimber on commercial forest land is estimated to total 3,620 million board feet, log scale, Scribner rule, or 3,937 million board feet, International ¼-inch rule. Eighty-one percent of the volume is in uncut sawtimber stands, and practically all of the remaining 19 percent is in selectively cut stands; the combined sawtimber volume in immature stands and on nonstocked areas comprises less than one-half of one percent.

Volume of Sawtimber by Species

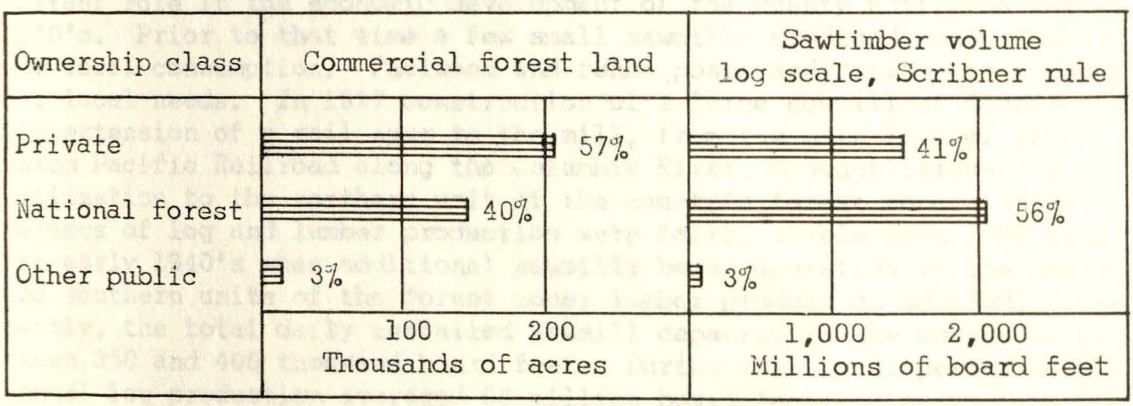


Sawtimber Volume

Species	Million bd. ft.	Percent
Ponderosa pine	1,731	48
Douglas-fir	981	27
White fir	625	17
Other	283	8
Total	3,620	100

Ponderosa pine is the county's most abundant and valuable commercial species. It comprises 50 percent of the volume in the uncut stands and 36 percent of the volume in the selectively cut stands. Douglas-fir and white fir occur in appreciable volumes and have commercial importance, although they have not yet been extensively utilized in this county. "Other" species include western larch, lodgepole pine and Engelmann spruce.

FOREST OWNERSHIP



Commercial Forest land

Of the 357 thousand acres of commercial forest land in the county, private owners have a total of 204 thousand; the Federal Government has 143 thousand in national forest lands and 9 thousand in public domain lands; and the State of Oregon has the remaining 1 thousand.

Nearly three-fourths of the private commercial area has been logged by operations that removed chiefly the ponderosa pine sawtimber; there remains 56 thousand acres of uncut private sawtimber. Stands on 95 thousand acres of the logged area qualify as selectively cut sawtimber. Young stands of poletimber are sapling and seedling size and occupy a total of 51 thousand acres; about 2 thousand acres are nonstocked.

The national forest commercial forest land lies in two national forests: 21 percent in the Umatilla in the northeast portion of the county and 79 percent in the Ochoco in the southern portion (fig. 1). Combined, the two national forests have 125 thousand acres of uncut sawtimber and 14 thousand acres of selectively cut sawtimber. Young stands occupy 4 thousand acres.

"Other public" includes public-domain lands administered by the Bureau of Land Management and lands owned by the State; these lands are chiefly stocked with sawtimber, both uncut and selectively cut.

Sawtimber Volume

The privately owned sawtimber volume totals 1,474 million board feet, log scale, Scribner rule, the bulk of which is in the northern and central units of the county's commercial forest zone. Combined volume on national forest lands is 2,051 million board feet, 19 percent on the Umatilla and 81 percent on the Ochoco. Stands on the public-domain lands contain 86 million and those on State lands 9 million.

FOREST UTILIZATION

Utilization of wood products from the forests did not play an important role in the economic development of the county until the latter 1920's. Prior to that time a few small sawmills produced rough lumber for local consumption. Fuelwood and fence posts and rails were also cut for local needs. In 1927 construction of a large sawmill at Kinzua and the extension of a rail spur to the mill, from the main line of the Union Pacific Railroad along the Columbia River, brought large-scale utilization to the northern unit of the county's forest zone. Annual volumes of log and lumber production were fairly stable from 1928 until the early 1940's when additional sawmills began operating in the central and southern units of the forest zone; lumber production doubled. Presently, the total daily installed sawmill capacity in the county is between 350 and 400 thousand board feet. During the 5-year period 1949-53 annual log production averaged 63 million board feet.

Throughout the years, ponderosa pine has comprised all but a few percent of the annual volume of logs produced. Approximately 96 percent of the total volume of logs cut in the county has been of this species.

Table 1.--Land area by major classes of land, 1953

Class of land	Area
	Acres
Forest:	
Commercial	356,580
Noncommercial:	
Productive-reserved	2,100
Unproductive	206,780
Total	565,460
Nonforest	536,670
Total, all classes	1,102,130

Table 2.--Area of commercial forest land by ownership and stand-size class, 1953

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Nonstocked areas
	Acres	Acres	Acres	Acres	Acres
Private	204,040	151,330	47,880	3,240	1,590
State	840	680	120	40	
Federal:					
Bureau of Land Mgt.	8,920	7,010	1,870	40	
National Forest	142,780	138,380	4,000	240	160
Total Federal	151,700	145,390	5,870	280	160
All ownerships	356,580	297,400	53,870	3,560	1,750

Table 3.--Area of commercial forest land by major forest type and stand-size class, 1953

Forest type	Total	Sawtimber stands		Pole-timber stands	Seedling and sapling stands	Non-stocked areas
		Large 1/	Small 2/			
	Acres	Acres	Acres	Acres	Acres	Acres
Ponderosa pine	321,320	163,090	102,610	52,060	3,560	
Lodgepole pine	3,170		1,480	1,690		
Douglas-fir	7,860	3,790	3,950	120		
Fir-spruce	21,240	17,960	3,280			
Western larch	1,160	520	640			
Hardwoods	80		80			
Nonstocked	1,750					1,750
Total	356,580	185,360	112,040	53,870	3,560	1,750

1/ 21 inches d.b.h. and larger.

2/ 11 to 21 inches d.b.h.

Table 4.--Area of commercial and noncommercial forest land and nonforest land by cover type and ownership class, 1953

(Acres)

Survey type symbol	Cover type	Total	Unreserved							Reserved		
			Total	Private	State	County	Federal: Bureau of Land Mgt.	Federal: Bureau of Reclamation	Federal: National Forest	Total	State	Federal: National Forest
	ALL LANDS											
	Forest land	565,460	563,360	377,900	2,880	320	35,930		146,330	2,100	180	1,920
	Nonforest land	536,670	536,670	454,840	1,430		60,120	3,750	16,530			
	Total	1,102,130	1,100,030	832,740	4,310	320	96,050	3,750	162,860	2,100	180	1,920
	COMMERCIAL FOREST LAND											
P4	Ponderosa pine large sawtimber	165,150	163,090	50,870	280		3,600		108,340	2,060	180	1,880
P3	Ponderosa pine small sawtimber	102,610	102,610	93,690	400		3,250		5,270			
P2	Ponderosa pine poletimber	52,060	52,060	47,720	120		1,870		2,350			
P1	Ponderosa pine seedlings and saplings	3,560	3,560	3,240	40		40		240			
LP3	Lodgepole pine small sawtimber	1,480	1,480	120					1,360			
LP2	Lodgepole pine poletimber	1,690	1,690	40					1,650			
D4	Douglas-fir small old-growth and large young-growth sawtimber (red fir)	3,790	3,790	680					3,110			
D3	Douglas-fir small sawtimber	3,950	3,950	3,430					520			
D2	Douglas-fir poletimber	120	120	120								
WL4	Western larch large sawtimber	520	520	80					440			
WL3	Western larch small sawtimber	640	640						640			
WF4	White fir large sawtimber	17,960	17,960	720			160		17,080			
WF3	White fir small sawtimber	3,320	3,280	1,660					1,620	40		40
HD3	Hardwood small sawtimber	80	80	80								
X	Recent clearcut area, nonstocked	80	80	80								
XO	Old clearcut area, nonstocked	600	600	600								
F	Deforested by fire, nonstocked	1,070	1,070	910					160			
	Total	358,680	356,580	204,040	840		8,920		142,780	2,100	180	1,920
	NONCOMMERCIAL FOREST LAND											
J	Juniper	206,620	206,620	173,820	2,040	320	26,890		3,550			
NR	Noncommercial rocky	160	160	40			120					
	Total	206,780	206,780	173,860	2,040	320	27,010		3,550			
	NONFOREST LAND											
A&G	Agriculture, grass and brush	536,230	536,230	454,440	1,430		60,080	3,750	16,530			
O	Open--nonvegetative	440	440	400			40					
	Total	536,670	536,670	454,840	1,430		60,120	3,750	16,530			

Table 5.--Area of commercial forest land by generalized forest type and ownership class, 1953

(Acres)

Generalized forest type		Total	Unreserved					Reserved		
			Total	Private	State	Federal		Total	State	Federal
						Bureau of Land Mgt.	National Forest			National Forest
Conifer large sawtimber:										
Types P4, D4, WL4, and WF4	Uncut	161,740	159,680	36,850	280	3,440	119,110	2,060	180	1,880
	Selectively cut	25,680	25,680	15,500		320	9,860			
	Total	187,420	185,360	52,350	280	3,760	128,970	2,060	180	1,880
Conifer small sawtimber:										
Types P3, LP3, D3, WL3 and WF3	Uncut	25,900	25,860	19,030	200	960	5,670	40		40
	Selectively cut	86,100	86,100	79,870	200	2,290	3,740			
	Total	112,000	111,960	98,900	400	3,250	9,410	40		40
Conifer poletimber:	On cutovers	35,420	35,420	33,860		720	840			
Types P2, LP2, and D2	On other	18,450	18,450	14,020	120	1,150	3,160			
	Total	53,870	53,870	47,880	120	1,870	4,000			
Conifer seedlings and saplings:										
Type P1	On cutovers	2,040	2,040	1,960	40	40				
	On plantations	160	160				160			
	On other	1,360	1,360	1,280			80			
	Total	3,560	3,560	3,240	40	40	240			
Recent clearcut areas nonstocked:										
Type X		80	80	80						
Clearcut and burned-over areas, nonstocked:										
Types XO and F		1,670	1,670	1,510			160			
Hardwoods:										
Type HD3		80	80	80						
	Total	358,680	356,580	204,040	840	8,920	142,780	2,100	180	1,920

Table 6.--Net volume of live sawtimber[1/] and growing stock[2/] on commercial forest land by ownership class, 1953

Ownership class	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Private	1,474	1,608	333
State	9	10	2
Federal:			
Bureau of Land Mgt.	86	93	19
National Forest	2,051	2,226	432
Total Federal	2,137	2,319	451
All ownerships	3,620	3,937	786

1/ Includes live trees 11.0 inches diameter breast height and larger measured in board feet.

2/ Includes live trees 5.0 inches diameter breast height and larger measured in cubic feet.

Table 7.--Net volume of live sawtimber and growing stock on commercial forest land by stand-size class, 1953

Stand-size class	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Sawtimber stands:			
Uncut	2,927	3,175	612
Selectively cut	678	745	168
Total sawtimber	3,605	3,920	780
Poletimber stands	14	16	6
Seedling and sapling stands	1	1	1/
Nonstocked areas	1/	1/	1/
Total	3,620	3,937	786

1/ Less than 500 thousand.

Table 8.--Net volume of live sawtimber and growing stock on commercial forest land, by species, 1953

Species	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Softwoods:			
Ponderosa pine	1,731	1,874	320
Lodgepole pine	4	5	7
Douglas-fir	981	1,081	249
White fir	625	675	160
Western larch	277	300	50
Engelmann spruce	2	2	1/
Total	3,620	3,937	786
Hardwoods	2/	2/	2/
All species	3,620	3,937	786

1/ Less than 500 thousand.

2/ Quaking aspen and black cottonwood occur in negligible quantities.

Table 9.--Net volume of live sawtimber on commercial forest land by diameter-class group, species group, and log rule, 1953

Diameter class and log rule	Total	Ponderosa pine	Douglas-fir	Other species
	- - Million board feet - -			
11.0" to 20.9" d.b.h.				
Scribner rule	861	282	354	225
International ¼-inch rule	981	327	411	243
21.0" to 30.9" d.b.h.				
Scribner rule	1,565	756	384	425
International ¼-inch rule	1,688	815	414	459
31.0" to 40.9" d.b.h.				
Scribner rule	921	510	171	240
International ¼-inch rule	982	541	181	260
41.0" d.b.h. and larger				
Scribner rule	273	183	72	18
International ¼-inch rule	286	191	75	20
All diameter classes				
Scribner rule	3,620	1,731	981	908
International ¼-inch rule	3,937	1,874	1,081	982

Table 10.--Net volume of all timber on commercial forest land by class of material and species group, 1953

Class of material	Total	Softwoods	Hardwoods
	Million cubic feet	Million cubic feet	Million cubic feet
Growing stock:			
Sawtimber trees:			
Sawlog portion	631	631	
Upper stem portion	48	48	
Total	679	679	
Poletimber trees	107	107	
Total growing stock	786	786	
Other material:			
Sound cull trees	1/	1/	
Rotten cull trees	4	4	
Salvable dead trees	5	5	
Total other material	9	9	
Total, all timber	795	795	—

1/ Less than 500 thousand.

Table 11.--Average annual cut from live sawtimber and growing stock on commercial forest land by species group for the period 1949-53 incl.

Species group	Live sawtimber						Growing stock		
	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/
	Thousand board feet, log scale, Scribner rule			Thousand board feet, International ¼-inch rule			Thousand cubic feet		
Softwoods	80,155	4,433	84,588	87,169	4,820	91,989	13,702	1,647	15,349
Hardwoods 2/									
Total	80,155	4,433	84,588	87,169	4,820	91,989	13,702	1,647	15,349

1/ Annual cut is the sum of timber products and logging residues.

2/ Hardwood cut insignificant.

FOREST SURVEY PROCEDURE

The procedures used in the reinventory of Wheeler County were materially different from the procedures used in the initial inventory. This change in procedures accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of the procedures used in each inventory seems desirable.

Initial Inventory

The initial inventory of the county was conducted in 1936 by what was known as the "compilation method." In this method existing information on forest types, timber cruises, logging records, and other pertinent data, were collected from private timber owners and various public agencies. These data were checked in the field for reliability, and were adjusted to the then existing specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by reliable existing information were obtained through field reconnaissance.

All land in the county was classified as either forest or nonforest. Forest land was further classified as commercial or noncommercial; the commercial was still further classified by forest type, stand-size or condition class, and in case of young growth, by stocking class. All such types and classes were mapped in place on 1-inch-to-the-mile base maps of each forested township. These township type maps were then superimposed over current ownership-status plats and dot counted to obtain forest-type-area statistics by ownership class. Type delineations on the township maps were traced to a base map of the county to form a county forest type map. The commercial forest land was also classified as to site quality, or forest-productive capacity.

In-place, timber-volume estimates were based on existing cruises collected and adjusted to the Forest Survey standard, on field samples, and on ocular appraisals. Cruises made by commercial cruisers were obtained for most of the privately owned timber and Forest Service cruises were available for a large portion of the national forest lands. Separate volume estimates were computed for each of the commercial tree species and for each ownership class. Methods used in this initial inventory did not permit a statistical computation of accuracy of the estimate.

Reinventory

In the reinventory in 1953 the forest type map of the county was completely revised. This revision was accomplished through interpretation, classification, and field mapping on aerial photos which covered all of the commercial forest land and most of the juniper woodland. In the delineation of types and conditions on aerial photos, those types

whose classification was difficult were examined more closely in the field. The presence of roads through much of the forested area greatly facilitated these examinations. Types, stand-size classes, and stocking classes were similar to those recognized in the initial inventory. However, field mapping on aerial photos resulted in much greater accuracy and detail than was possible in the earlier inventory through ground reconnaissance alone. Type delineations on the aerial photos were transferred to a 2-inch scale county planimetric base map through use of a photo projector. The new type map was then superimposed over a current ownership-status map and a dot count made of forest type areas by ownership class.

Estimates of net volumes of live sawtimber, growing stock, sound cull, and salvable-dead material were developed by applying average-per-acre volumes to the appropriate forest-type acreages. The per-acre volumes for stands of uncut sawtimber, selectively cut sawtimber, and poletimber were obtained through a sampling procedure in which the stands were measured on randomly selected plots. Comparable sawtimber and poletimber per-acre volumes contained in scattered trees in the overstory of seedling and sapling stands and on nonstocked areas were based on empirical estimates. In the random selection of samples each individual sawtimber or poletimber plot in the county had an equal chance to be chosen. A sample consisted of a series of three one-fifth-acre circular plots spaced at 6-chain intervals. Intensity of the sampling was designed to produce a total estimate of volume with a specified sampling accuracy. In the southern unit of commercial forest land the random samples measured in the Forest Survey reinventory were supplemented by samples taken by the forest supervisor's staff of the Ochoco National Forest for use in developing forest-management plans.

ACCURACY OF REINVENTORY DATA

Forest Area

In the reinventory of the county, in-place mapping of the forests and their classification by forest type, stand-size class, or condition class, were on the basis of 100-percent coverage. Thus no error due to sampling was involved. Errors due to techniques or judgment in the field and in office computation of data were possible, but difficult to evaluate. Throughout all phases of the work close supervision and frequent checks assured a high level of accuracy and uniformity of standards.

Timber Volume

The probabilities are about 19 out of 20 that the actual board-foot volume of live sawtimber, if measured by a 100-percent tree cruise, would be within plus or minus 20.6 percent of the estimated total of 3,620 million board feet. On this basis the actual total volume would be somewhere between 2,874 and 4,366 million board feet. The same probabilities exist

for the estimated 786 million cubic feet of growing stock with a range of plus or minus 18.4 percent. Volume estimates by species, stand-size class, or other subdivision, have greater sampling errors than the county totals because smaller volumes are involved.

DIFFERENCE IN RESULTS OF INVENTORIES

Some of the differences in forest-type and timber-volume statistics resulting from the 1936 and 1953 inventories are due to actual physical change. Other differences are due to variations in procedures used, in interpretation and classification of forest conditions, and in standards of utilization. Because of these differences direct comparison of the statistics is not meaningful.

Forest Area

Forest-area statistics resulting from the two inventories are shown in the following table:

Inventory	Total forest land	Commercial forest land						Noncommercial forest land
			Sawtimber		Pole-timber	Seedlings and saplings	Nonstocked area	
		Total	Uncut	Selectively cut				
	Thousands of acres							
1936	390	325	281	11	16	15	2	65
1953	565	358	186	112	•54	4	2	207

The large difference in the 1936 and 1953 total forest land areas, an apparent increase of 175 thousand acres during the interval, was not due to any physical change in the forest cover. Instead, it was chiefly due to a difference in classification of a large acreage of sparse and low-bushy growth of western juniper in the western portion of the county. In 1936 this juniper woodland was classed as nonforest land; in 1953 it was classed as noncommercial forest land. The net difference in juniper area between inventories amounted to 154 thousand acres. Remainder of the increase in forest land acreage was due to inclusion in 1953 of marginal, low-density stands of ponderosa pine along the fringes of the commercial forest zone and on open, rocky glades in the interior of the zone. The increase in commercial forest land area probably resulted from differences in application of survey techniques and definitions.

Timber Volume

The respective estimates of total sawtimber volume, by species group, obtained in the two inventories are shown in the tabulation below:

Inventory	Live sawtimber volume				
	All species	Ponderosa pine	Douglas-fir	White fir	Other species 1/
	Million board feet, log scale, Scribner rule				
Initial, 1936	2,730	2,082	342	150	156
Reinventory, 1953	3,620	1,731	981	625	283

1/ Includes western larch, lodgepole pine and Engelmann spruce.

The 1936 estimate was based on adjusted existing private cruises, on national-forest cruises, and on ocular appraisals of uncruised stands. The cruises covered the major portion of both the private and national-forest sawtimber acreages. The 1953 estimate was based on a sampling procedure, as described on page 15 under "Forest Survey Procedure - Reinventory."

A considerable portion of the increase in volume during the 17 years was undoubtedly due to forest growth, i.e., increment in sawtimber trees and the ingrowth of poletimber trees into the sawtimber class. Conversely, the timber inventory was decreased during the interval through timber cutting operations and the activities of such natural depleting agencies as forest insects, diseases, and wind. Cutting depletion was confined very largely to ponderosa pine; only in recent years have the other species in the county been cut in any appreciable quantity.

Some of the difference between the two estimates probably resulted from the variation in procedures. However, the extent of this influence cannot be evaluated. Technique errors in various phases of the work, also not subject to evaluation, may have affected either one or both of the estimates.

Another cause of the difference in volumes may have been the variation in standards of utilization between inventories, particularly as they apply to the species other than pine; the respective standards for pine were quite similar. The standards for Douglas-fir, white fir and western larch were intensified in 1953 to take cognizance of the increased degree of industrial use of these species. Volume tables were used that gave a materially greater volume for a tree of a given size than did the tables used in the 1936 inventory. Other changes included lowering the minimum top diameter of merchantable length of a sawtimber tree, and reduction of the minimum requirement of net sound volume in a sawtimber tree from 33-1/3 to 25 percent of gross volume.

Because of the basis of the two estimates and the several factors that have tended to influence them, they do not reflect significant trends in the county's timber resource.

DEFINITION OF TERMS USED

Land Area

Total Land

Includes dry land and unmeandered water surface.

Forest Land

Includes (a) land which is at least 10-percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in "(a)" have been removed to less than 10-percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the county was 10 acres.

Nonforest Land

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the county was 10 acres.

Forest Land Classes

Commercial Forest Land

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

Noncommercial Forest Land

Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land and (b) incapable of yielding usable wood products (usually sawtimber) because of the adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Productive-reserved. Forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Forest Types

Forest Type

A forest stand characterized by the predominance of certain key species--in terms of cubic volume for sawtimber and poletimber stands, and in number of trees for seedling and sapling stands--or a forest condition such as nonstocked cutover or burned-over land. In classifying forest land by type the minimum area recognized was 40 acres. The major forest types listed in table 3 are of the following composition:

Ponderosa pine. Forests in which 20 percent or more of the stand is ponderosa pine.

Lodgepole pine. Forests in which 50 percent or more of the stand is lodgepole pine.

Douglas-fir. Forests in which 50 percent or more of the stand is Douglas-fir.

Larch. Forests in which 50 percent or more of the stand is western larch.

Fir-spruce. Forests in which 50 percent or more of the stand is of white fir (Abies concolor and grandis) or Engelmann spruce.

Pinion pine-juniper. Forests in which 50 percent or more of the stand is western juniper.

Nonstocked areas. Cutover or burned-over areas on which the restocking, if any, is less than 10 percent density and which does not support a residual stand meeting minimum sawtimber requirements.

Tree Classes

Sawtimber Tree

Softwood or hardwood tree 11.0 inches d.b.h. or larger containing at least one 16-foot log to a variable top diameter inside bark approximating 40 percent of diameter breast height, but never less than 8 inches, and in which 25 percent or more of the gross board-foot volume is free from rot and defect.

Poletimber Tree

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable, now or prospectively, because of defect or rot.

Sound cull tree. Live tree of sawtimber or poletimber size which contains 25 percent or more of sound volume but will not make at least one merchantable log, now or prospectively, because of roughness or poor form.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Salvable Dead Tree

Standing dead or down tree which contains 25 percent or more of sound volume and at least one merchantable log.

Stand-Size Classes

Sawtimber Stand

Stand of sawtimber trees having a minimum net volume of 1,500 board feet, log scale, Scribner rule.

Large sawtimber stand. Stand in which the majority of the volume is in trees more than 21.0" d.b.h.

Small sawtimber stand. Stand in which the majority of the volume is in trees from 11.0" to 20.9" d.b.h.

Poletimber Stand

Stand failing to meet sawtimber-stand specifications but of at least 10-percent stocking of trees 5.0 inches d.b.h. and larger, with at least one-half the minimum stocking in poletimber trees (5.0 inches to 10.9 inches d.b.h.).

Seedling and Sapling Stand

Stand not qualifying as either sawtimber or poletimber stand but having at least 10-percent stocking of trees and with at least one-half the minimum stocking in seedlings and saplings (0-inch to 4.9 inches d.b.h.).

Uncut Sawtimber Stand

Stand that is essentially undisturbed by cutting.

Selectively Cut Sawtimber Stand

Stand in which a partial harvest has been made, and in which the residual volume amounts to 1,500 board feet per acre or more.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees:

Scribner rule. The common board-foot rule used in determining log-scale volume of sawtimber in this region. This rule underestimates, particularly in case of timber of the smaller diameters, the volume of lumber that could be produced from the timber.

International ¼-inch rule. The standard board-foot rule adopted by the Forest Service in the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

Sawtimber Volume

Net volume in board feet of live and salvable dead sawtimber trees to a merchantable top.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top inside bark.

Tree Species

Tree species commonly found in Wheeler County include:

Softwoods:
- Ponderosa pine (Pinus ponderosa)
- Lodgepole pine (Pinus contorta)
- Douglas-fir (Pseudotsuga menziesii)
- White fir (Abies concolor and grandis)
- Western larch (Larix occidentalis)
- Engelmann spruce (Picea engelmannii)
- Western juniper (Juniperus occidentalis)

Hardwoods: Quaking aspen (Populus tremuloides)

Western juniper is not considered of commercial quality in this county.

Timber Cut

Annual Cut of Live Sawtimber

The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from live sawtimber. The volume of timber products cut from live sawtimber.

Logging residues from live sawtimber. The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land and not converted to timber products.

Annual Cut of Growing Stock

The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from growing stock. The volume of timber products cut from growing stock.

Logging residues from growing stock. The net cubic-foot volume of growing stock cut or killed by logging on commercial forest land and not converted to timber products.

Accuracy of Data

Sampling Error

A measure of the reliability of timber volume estimates based on the variability shown by sample measurements of the volume.